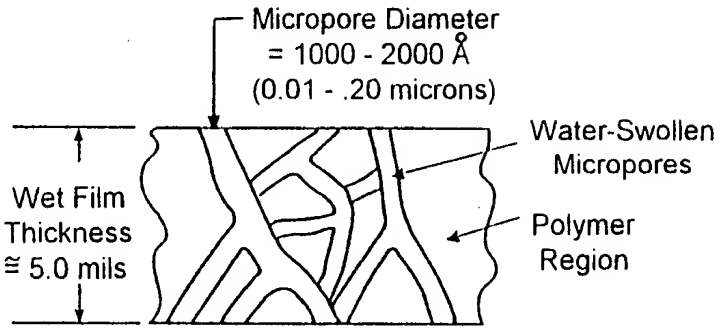
The Gas Permeability and Ionic Conductivity Properties of the Microcomposite Membrane will be Adjusted by Controlling the Concentration of Infiltrated Ion-Conducting Polymer and its Degree of Sulfonation



A. Water-Swollen Microporous Membrane

Micropore Diameter
= 1 - 5 Å (10^{-4} microns)

1. Drying
2. Heat-Treatment
3. Film Shrinkage through the Thickness

Membrane Dry Thickness
≅ 0.5 mil at 0% Ion-Conductor

B. Dried, Heat-Treated, Substrate Membrane

1. Solvent-Exchange
2. Ion-Conductor Infiltration
3. Drying, Heat-Treatment

Micropore Diameter and Dry Film Thickness will Decrease with Decreasing Infiltrant Concentration

Ion-Conducting Polymer Regions Interpenetrating Polymer Regions

Micropore Diameter
= ~50 - 1000 Å
(0.05 - 0.5 microns)

Dry Film Thickness
= ~ 1 mil at 10% Ion-Conducting Polymer Solution Concentration

Substrate Polymer Regions

C. Dried, Heat-Treated Microcomposite Membrane Containing ~ 50 Volume Percent Ion-Conducting Polymer

FIG. 1

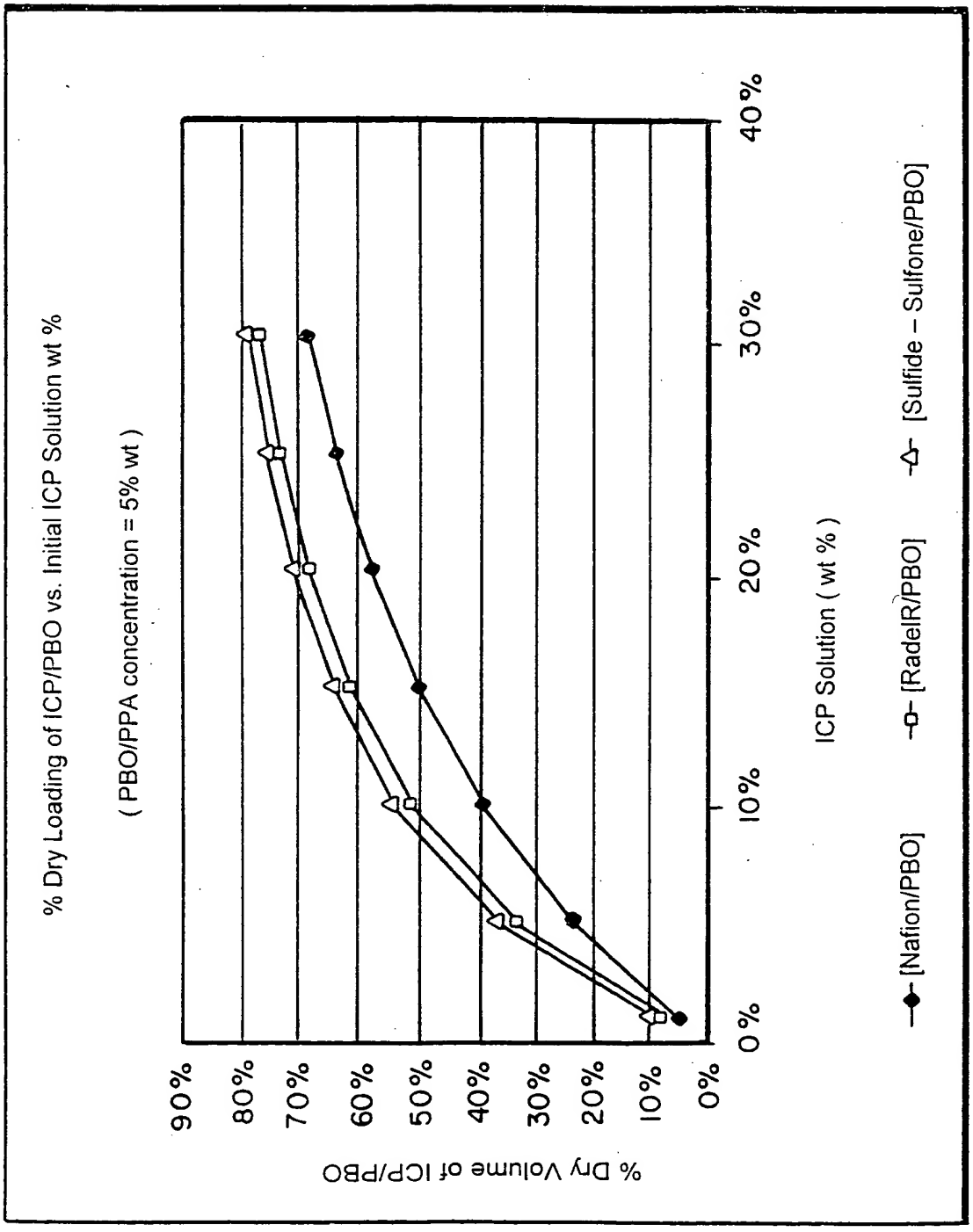

% Dry Loading of ICP/PBO vs. Initial ICP Solution wt %
(PBO/PPA concentration = 5% wt)
% Dry Volume of ICP/PBO
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0%
10%
20%
30%
40%
ICP Solution (wt %)
[Nafion/PBO]
[RadelR/PBO]
[Sulfide – Sulfone/PBO]

FIG. 2